

Amendments to the Claims

The listing of claims will replace all prior versions, and listings of claims in the application.

1-296. (Canceled)

297. (New) A method to prophylactically vaccinate a vertebrate against anthrax infection comprising: administering to a vertebrate in need thereof a composition comprising a carrier, (\pm) -N-(3-aminopropyl)-N,N-dimethyl-2,3-bis(syn-9-tetradecenyl-oxy)-1-propanaminium bromide (GAP-DMORIE), a co-lipid and an isolated polynucleotide comprising a nucleic acid fragment which encodes a polypeptide identical to amino acids 30 to 764 of SEQ ID NO: 4, wherein the amino acid sequence of said polypeptide corresponding to Ser-Arg-Lys-Lys-Arg-Ser at position 192-197 of SEQ ID NO: 4 have been deleted;

wherein said composition elicits an immune response to said polypeptide;

and wherein said nucleic acid fragment is codon optimized and selected from the group consisting of SEQ ID NO: 23, SEQ ID NO: 24 and SEQ ID NO: 25;

wherein said vertebrate generates a prophylactically effective immune response thereby protecting said vertebrate against anthrax infection.

298. (New) The method of claim 297, wherein the amino acids of said polypeptide corresponding to amino acids 342 and 343 of SEQ ID NO: 4 have been deleted.

299. (New) The method of claim 297, wherein said polynucleotide is SEQ ID NO: 7.

300. (New) The method of claim 299, further comprising a vector comprising said polynucleotide, wherein said vector is VR 6262.

301. (New) The method of claim 297, wherein said nucleic acid fragment is ligated to a heterologous nucleic acid.

302. (New) The method of claim 301 wherein said heterologous nucleic acid encodes a heterologous polypeptide fused to the polypeptide encoded by said nucleic acid fragment.

303. (New) The method of claim 302, wherein said heterologous polypeptide is a secretory signal peptide.

304. (New) The method of claim 303, wherein said signal peptide is a human tissue plasminogen activator (hTPA) signal peptide.

305. (New) The method of claim 297, wherein said co-lipid is selected from the group consisting of:

1,2-dioleoyl-sn-glycero-3-phosphoethanolamine (DOPE),

1,2-diphytanoyl-sn-glycero-3-phosphoethanolamine (DPyPE), and

1,2-dimyristoyl-glycero-3-phosphoethanolamine (DMPE).

306. (New) The method of claim 305, wherein said co-lipid is DPyPE.

307. (New) The method of claim 306, wherein said GAP-DMORIE and DPyPE are in a 1:1 molar ratio.

308. (New) The method of claims 297, wherein said administration is via intramuscular route.

309. (New) A method to reduce the severity of anthrax infection in a vertebrate comprising: administering to a vertebrate in need thereof a composition comprising a carrier, (\pm)-N-(3-aminopropyl)-N,N-dimethyl-2,3-bis(syn-9-tetradecenyl-oxy)-1-propanaminium bromide (GAP-DMORIE), a co-lipid and an isolated polynucleotide comprising a nucleic acid fragment which encodes a polypeptide identical to amino acids 30 to 764 of SEQ ID NO: 4, wherein the amino acid sequence of said polypeptide corresponding to Ser-Arg-Lys-Lys-Arg-Ser at position 192-197 of SEQ ID NO: 4 have been deleted;

wherein said composition elicits an immune response to said polypeptide;

and wherein said nucleic acid fragment is codon optimized and selected from the group consisting of SEQ ID NO: 23, SEQ ID NO: 24 and SEQ ID NO: 25;

wherein said vertebrate generates an effective immune response thereby reducing the severity of anthrax infection.

310. (New) The method of claim 309, wherein the amino acids of said polypeptide corresponding to amino acids 342 and 343 of SEQ ID NO:4 have been deleted.

311. (New) The method of claim 309, wherein said polynucleotide is SEQ ID NO: 7.

312. (New) The method of claim 299, further comprising a vector comprising said polynucleotide, wherein said vector is VR 6262.

313. (New) The method of claim 309, wherein said nucleic acid fragment is ligated to a heterologous nucleic acid.

314. (New) The method of claim 313, wherein said heterologous nucleic acid encodes a heterologous polypeptide fused to the polypeptide encoded by said nucleic acid fragment.

315. (New) The method of claim 314, wherein said heterologous polypeptide is a secretory signal peptide.

316. (New) The polynucleotide of claim 315, wherein said signal peptide is a human tissue plasminogen activator (hTPA) signal peptide.

317. (New) The method of claim 309, wherein said co-lipid is selected from the group consisting of:

1,2-dioleoyl-sn-glycero-3-phosphoethanolamine (DOPE),
1,2-diphytanoyl-sn-glycero-3-phosphoethanolamine (DPyPE), and
1,2-dimyristoyl-glycero-3-phosphoethanolamine (DMPE).

318. (New) The method of claim 317, wherein said co-lipid is DPyPE.

319. (New) The method of claims 309, wherein said administration is via intramuscular route.

320. (New) A method to prophylactically vaccinate a vertebrate against anthrax infection comprising: administering to a vertebrate in need thereof a composition comprising a carrier, (\pm)-N-(2-hydroxyethyl)-N,N-dimethyl-2,3-bis(tetradecyloxy)-1-propanaminium bromide (DMRIE), a co-lipid and an isolated polynucleotide comprising a nucleic acid fragment which encodes a polypeptide identical to amino acids 30 to 764 of SEQ ID NO: 4, wherein the amino acid sequence of said polypeptide corresponding to Ser-Arg-Lys-Lys-Arg-Ser at position 192-197 of SEQ ID NO: 4 have been deleted;

wherein said composition elicits an immune response to said polypeptide;

and wherein said nucleic acid fragment is codon optimized and selected from the group consisting of SEQ ID NO: 23, SEQ ID NO: 24 and SEQ ID NO: 25;

wherein said vertebrate generates a prophylactically effective immune response thereby protecting said vertebrate against anthrax infection.

321. (New) The method of claim 320, wherein the amino acids of said polypeptide corresponding to amino acids 342 and 343 of SEQ ID NO:4 have been deleted.

322. (New) The method of claim 320, wherein said polynucleotide is SEQ ID NO: 7.

323. (New) The method of claim 299, further comprising a vector comprising said polynucleotide, wherein said vector is VR 6262.

324. (New) The method of claim 320, wherein said nucleic acid fragment is ligated to a heterologous nucleic acid.

325. (New) The method of claim 324, wherein said heterologous nucleic acid encodes a heterologous polypeptide fused to the polypeptide encoded by said nucleic acid fragment.

326. (New) The method of claim 325, wherein said heterologous polypeptide is a secretory signal peptide.

327 (New) The method of claim 326, wherein said signal peptide is a human tissue plasminogen activator (hTPA) signal peptide.

328. (New) The method of claim 320, wherein said co-lipid is selected from the group consisting of:

1,2-dioleoyl-*sn*-glycero-3-phosphoethanolamine (DOPE),

1,2-diphytanoyl-*sn*-glycero-3-phosphoethanolamine (DPyPE), and

1,2-dimyristoyl-glycero-3-phosphoethanolamine (DMPE).

329. (New) The method of claim 328, wherein said co-lipid is 1,2-dioleoyl-*sn*-glycero-3-phosphoethanolamine (DOPE).

330 (New) The method of claim 329, wherein said DMRIE and DOPE are in a 1:1 molar ratio.

331. (New) The method of claims 320, wherein said administration is via intramuscular route.

332. (New) A method to reduce the severity of anthrax infection in a vertebrate comprising: administering to a vertebrate in need thereof a composition comprising a carrier, (\pm)-N-(2-hydroxyethyl)-N,N-dimethyl-2,3-bis(tetradecyloxy)-1-propanaminium bromide (DMRIE), a co-lipid and an isolated polynucleotide comprising a nucleic acid fragment which encodes a polypeptide identical to amino acids 30 to 764

of SEQ ID NO: 4, wherein the amino acid sequence of said polypeptide corresponding to Ser-Arg-Lys-Lys-Arg-Ser at position 192-197 of SEQ ID NO: 4 have been deleted;

wherein said composition elicits an immune response to said polypeptide;

and wherein said nucleic acid fragment is codon optimized and selected from the group consisting of SEQ ID NO: 23, SEQ ID NO: 24 and SEQ ID NO: 25;

wherein said vertebrate generates an effective immune response thereby reducing the severity of anthrax infection.

333. (New) The method of claim 332, wherein the amino acids of said polypeptide corresponding to amino acids 342 and 343 of SEQ ID NO:4 have been deleted.

334. (New) The method of claim 332, wherein said polynucleotide is SEQ ID NO: 7.

335. (New) The method of claim 299, further comprising a vector comprising said polynucleotide, wherein said vector is VR 6262.

336. (New) The method of claim 332, wherein said nucleic acid fragment is ligated to a heterologous nucleic acid.

337. (New) The method of claim 336, wherein said heterologous nucleic acid encodes a heterologous polypeptide fused to the polypeptide encoded by said nucleic acid fragment.

338. (New) The method of claim 337, wherein said heterologous polypeptide is a secretory signal peptide.

339. (New) The method of claim 338, wherein said signal peptide is a human tissue plasminogen activator (hTPA) signal peptide.

340. (New) The method of claim 332, wherein said co-lipid is selected from the group consisting of:

1,2-dioleoyl-*sn*-glycero-3-phosphoethanolamine (DOPE),

1,2-diphytanoyl-*sn*-glycero-3-phosphoethanolamine (DPyPE), and

1,2-dimyristoyl-glycero-3-phosphoethanolamine (DMPE).

341. (New) The method of claim 340, wherein said co-lipid is DPyPE.

342. (New) The method of claims 332, wherein said administration is via intramuscular route.

343. (New) A composition comprising a carrier, a lipid selected from the group consisting of: (\pm)-N-(3-aminopropyl)-N,N-dimethyl-2,3-bis(*syn*-9-

tetradecenyl-1-propanaminium bromide (GAP-DMORIE), (\pm)-N-(2-hydroxyethyl)-N,N-dimethyl-2,3-bis(tetradecyloxy)-1-propanaminium bromide (DMRIE) and a combination thereof, a co-lipid and an isolated polynucleotide comprising a nucleic acid fragment which encodes a polypeptide identical to amino acids 30 to 764 of SEQ ID NO: 4, wherein the amino acid sequence of said polypeptide corresponding to Ser-Arg-Lys-Lys-Arg-Ser at position 192-197 of SEQ ID NO: 4 have been deleted;

wherein said composition elicits an immune response to said polypeptide;

and wherein said nucleic acid fragment is codon optimized and selected from the group consisting of SEQ ID NO: 23, SEQ ID NO: 24 and SEQ ID NO: 25.

344. (New) The composition of claim 343, wherein the amino acids of said polypeptide corresponding to amino acids 342 and 343 of SEQ ID NO:4 have been deleted.

345. (New) The composition of claim 343, wherein said polynucleotide is SEQ ID NO: 7.

346. (New) A vector comprising the polynucleotide of claim 345, wherein said vector is VR 6292.

347. (New) The composition of claim 343, wherein said nucleic acid fragment is ligated to a heterologous nucleic acid.

348. (New) The composition of claim 347, wherein said heterologous nucleic acid encodes a heterologous polypeptide fused to the polypeptide encoded by said nucleic acid fragment.

349. (New) The composition of claim 348, wherein said heterologous polypeptide is a secretory signal peptide.

350. (New) The composition of claim 349, wherein said signal peptide is a human tissue plasminogen activator (hTPA) signal peptide.

351. (New) The composition of claim 343, wherein said co-lipid is selected from the group consisting of:

1,2-dioleoyl-*sn*-glycero-3-phosphoethanolamine (DOPE),
1,2-diphytanoyl-*sn*-glycero-3-phosphoethanolamine (DPyPE), and
1,2-dimyristoyl-glycero-3-phosphoethanolamine (DMPE).

352. (New) The composition of claim 351, wherein said lipid is GAP-DMORIE.

353. (New) The composition of claim 351, wherein said lipid is DMRIE.

354. (New) The composition of claim 352, wherein said co-lipid is DPyPE.

355. (New) The composition of claim 353, wherein said co-lipid is DOPE.

356. (New) The composition of claim 354, wherein said polynucleotide is SEQ
ID NO: 7.

357. (New) The composition of claim 355, wherein said polynucleotide is SEQ
ID NO: 7.